Patent Claims

1. A radiation-emitting semiconductor component
- having a radiation-transmissive substrate (1), on the underside of which a radiation-generating layer (2) is arranged,
- in which the substrate (1) has inclined side areas (3),
- in which the refractive index of the substrate (n1) is greater than the refractive index (n2) of the radiation-generating layer (2),

wherein
- the difference in refractive index results in an unilluminated substrate region (4), into which no photons are coupled directly from the radiation-generating layer (2), and
- the substrate (1) has essentially perpendicular side areas (5) in the unilluminated region (4).

2. The component as claimed in claim 1,
wherein
that side of the radiation-generating layer (2) which is remote from the substrate (1) is provided for the mounting of the component.

3. The component as claimed in claim 2,
wherein
a mounting area is formed on that side of the radiation-generating layer (2) which is remote from the substrate (1).

4. The component as claimed in one of claims 1 to 3,
wherein
the perpendicular side areas (5) form a base (6) on the underside of the substrate, the inclined side areas (3) adjoining the top side of said base.

5. The component as claimed in claim 4,
wherein

the upper boundary of the unilluminated region (4) coincides with the upper boundary of the base (6).

6. The component as claimed in either of claims 4 and 5,
wherein
the height (h) of the base (6) is between 15 and 30 µm.

7. The component as claimed in one of claims 1 to 6,
wherein
the inclined side areas (3) form an angle (α) of between 15 and 40° with the underside of the substrate.

8. The component as claimed in one of claims 1 to 7,
wherein
the substrate (1) has a width (B) of between 300 and 2000 µm on the underside.

9. The component as claimed in one of claims 1 to 8,
wherein
the substrate (1) has a thickness (D) of between 200 and 300 µm.

10. The component as claimed in one of claims 1 to 9,
wherein
the radiation-generating layer (2) covers the underside of the substrate apart from an outer free edge (7) having a width (bF) of between 10 and 50 µm.

11. The component as claimed in one of claims 1 to 10,
wherein
the radiation-generating layer (2) has bevelled side edges (8), which reflect the light emitted laterally with respect to the substrate (1) in the direction of the substrate (1).

12. The component as claimed in claim 11,
wherein

the bevelled side edges (8) form an angle (β) of between 20 and 70° with the underside of the substrate.

13. The component as claimed in either of claims 11 and 12,
wherein
the bevelled edges (8) of the radiation-generating layer (2) form with the substrate (1) an angle (β) suitable for a total reflection of the radiation at the side edges (12).

14. The component as claimed in one of claims 11 to 13,
wherein
the side edges (12) of the radiation-generating layer (2) are covered with an optically reflective material (9).

15. The component as claimed in claim 14,
wherein
the optically reflective material (9) is aluminum or silver.

16. The component as claimed in one of claims 1 to 15,
wherein
- contact elements (10, 10a) are arranged on the top side of the substrate (1),
- the transverse conductivity of the substrate (1) leads to a conical extension of a current coupled into the substrate (1) from the contact element (10), and
- the contact elements (10) are spaced apart from one another in such a way that the current expansion cones (13) touch one another at a depth (T) at which the entire cross-sectional area of the substrate (1) is energized.

17. The component as claimed in claim 16,
wherein

the contact elements are interconnects (10) running along nested squares (11), the squares (11) having equidistant side edges (12) parallel to one another.

18. The component as claimed in claim 17, wherein the interconnects (10) have widths (bL1, bL2, bL3) that differ from one another in accordance with the surface of the substrate (1) that is to be energized.

19. The component as claimed in one of claims 1 to 18, wherein the substrate (1) contains silicon carbide.

20. The component as claimed in one of claims 1 to 19, wherein the substrate (1) contains hexagonal 6H silicon carbide.

21. The component as claimed in one of claims 1 to 20, wherein the radiation-generating layer (2) contains gallium nitride.

22. The component as claimed in one of claims 1 to 21, wherein the underside of the substrate has a width (B) of at least 300 µm.

23. A method for producing a radiation-emitting semiconductor component as claimed in one of the preceding claims, having the following steps:

a) sawing of V-shaped trenches (14) into a radiation-transmissive substrate (1) by means of a suitably shaped saw, a residual thickness (dr) of the substrate (1) remaining throughout,

b) singulation of the substrate (1) into a multiplicity of individual substrates (15) along the trenches (14).

24. The method as claimed in claim 23, wherein the singulation is effected by means of a saw having a straight saw blade.

25. The method as claimed in claim 24, wherein the singulation is effected by breaking.